

REMARKS

Claims 1-17 are pending in the above-identified patent application. Claims 1, 9 and 14 have been amended by way of the present amendment. Reconsideration is respectfully requested.

In the outstanding Office Action, claims 1-7, 9 and 11-12 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent Application Publication No. US2002/0159626 (Shiomi et al.); claims 8 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Shiomi et al. in view of “Spray Develop End-Point-Detection System” (Babinski); claim 10 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Shiomi et al. in view of “Video Sampling and Storage Device” (Casey et al.); and claims 14-17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Shiomi et al. in view of US Patent No. 5,196,353 (Sandu et al.).

35 U.S.C. § 102 Claim Rejections

Claims 1-7, 9 and 11-12 were rejected under 35 U.S.C. § 102(b) as being anticipated by Shiomi et al. Reconsideration is respectfully requested.

Independent claims 1, 9 and 14 have been amended to clarify the invention. In particular, claim 1 has been amended to recite:

obtaining parameter information from the process;
synchronizing a photostrobe and a camera in accordance
with the parameter information;
providing a plurality of reference images of a feature of a
reference object from the camera, the plurality of reference images
representing a range of process results corresponding to a first
sample time.

Claims 9 and 14 have been amended with similar language. Support for the amendments is provided by the original specification and figures. In particular, **FIG. 1** as shown below and the specification disclose: a manufacturing tool for controllably performing a manufacturing process

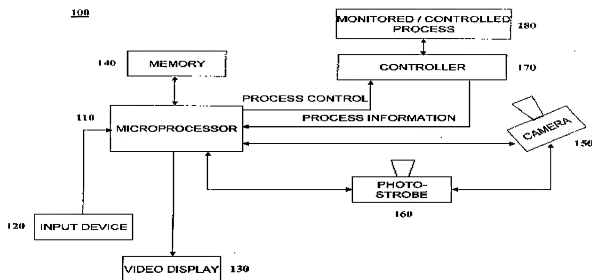


FIG. 1

180 operating on a moving object and controller 170, which is operatively connected between the microprocessor 110 and the manufacturing process 180; a camera 150 oriented to include a surface or other aspect of the moving object and is used to monitor and/or control manufacturing process 180. Further the specification discloses that process parameter information from process 180 may include, for example, the periodicity of a repetitive or moving process, the pressure of a polishing pad and/or rotational speed, or a flow rate of a coating material that is provided to microprocessor 110 through one or more data lines, either directly, or through controller 170. Moreover, the specification discloses that microprocessor 110 repeatedly causes photo-strobe 160 and camera 150 to operate in a synchronized fashion, based upon the periodicity of the

motion of process 180. Therefore, in consideration of the above disclosure, it is respectfully submitted that the amendments to the claims raise no question of new matter.

Shiomi et al. discloses an invention where a two-dimensional image of a substrate surface targeted for polishing is periodically picked up, and the image is analyzed to obtain an entropy H1, H2 of the two-dimensional image. In particular, Shiomi et al. discloses, as shown in FIG. 1 below, the structure of a polishing apparatus 100 comprising: a polishing pad 10, a first motor 12 for rotating the polishing pad 10, a wafer holder 20 for holding a semiconductor wafer WF to push it against the polishing pad 10, and a second motor 22 for rotating the wafer holder 20. Further, Shiomi et al. discloses the polishing apparatus 100 further comprises: a camera 30 for picking up an image of the wafer surface, a monochromatic light source 32 for illuminating the wafer surface, and a computer 40 for controlling the overall apparatus and that the computer 40 is connected with an external storage device 50 for storing image data and computer programs.

However, Shiomi et al. nowhere discloses, as claim 1 recites:

*obtaining parameter information from the process;
synchronizing a photostrobe and a camera in accordance
with the parameter information;
providing a plurality of reference images of a feature of a
reference object from the camera, the plurality of reference images
representing a range of process results corresponding to a first
sample time (emphasis added).*

Independent claims 9 and 14 have also been amended with similar language. That is, Shiomi et al. nowhere discloses the concepts of: “obtaining parameter information from the process” and “synchronizing a photostrobe and a camera in accordance with the parameter information” as recited in claim 1, and in similar language in claims 9 and 14. In fact, as shown in FIG. 1 of though Shiomi et al. discloses control signals from the computer 40 to motors 22, 12 in a process, FIG. 1 and Shiomi et al. nowhere discloses “obtaining parameter information” or a signal from the motors 22, 12 or a process that come back to the computer and that would be used in “synchronizing a photostrobe and a camera in accordance with the parameter information,” as recited in claim 1 and in similar language in independent claims 9 and 14. Therefore, it is respectfully submitted that Shiomi et al. does not disclose, anticipate or

inherently teach the claimed invention and that claims 1 and 9, and claims dependent thereon, patentably distinguish thereover.

35 U.S.C. § 103 Claim Rejections

Claims 8 and 13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Shiomi et al. in view of Babinski. Reconsideration is respectfully requested.

Claims 8 and 13 are ultimately dependent upon claims 1 and 9, respectively. As discussed above, Shiomi et al. does not disclose all of the limitations of claims 1 and 9. Thus, at least for the same reasons, Shiomi et al. also does not disclose the limitations of claims 8 and 13.

In addition the outstanding Office Action acknowledges other deficiencies in claims 8 and 13 and attempts to overcome these deficiencies by combining Babinski with Shiomi et al. However, Babinski cannot overcome all of the deficiencies of Shiomi et al., as will be discussed below.

Babinski disclose that by strobing a sample light reflection only at a specific planar region of a spinning product wafer, monochromatic light interference sensing for end-point detection of photoresist development is significantly reduced. . However, Babinski nowhere discloses, as claim 13 recites:

*a controller that is operatively connected between the processor and the manufacturing process,
wherein the controller obtains parameter information from the manufacturing process that is used to synchronize the light source and the image capturing device,
wherein the processor strobes the light source and actuates the image capturing device to capture an image of a feature of the moving object at a periodicity corresponding to a movement of the moving object (emphasis added).*

That is, Babinski nowhere discloses the concepts of: “a controller that is operatively connected between the processor and the manufacturing process” and “the controller obtains parameter information from the manufacturing process that is used to synchronize the light source and the

image capturing device” as recited in claim 13. Similarly, Babinski cannot overcome the deficiencies of the recitation of claim 1, as discussed above, which is a part of claim 8. Thus, Babinski cannot overcome all of the deficiencies of Shiomi et al. Therefore, it is respectfully submitted that neither Shiomi et al. or Babinski, whether taken alone or in combination, do not disclose, suggest or make obvious the claimed invention and that claims 8 and 13, and claims dependent thereon, patentably distinguish thereover.

Claim 10 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Shiomi et al. in view of Casey et al. Reconsideration is respectfully requested.

Claim 10 is ultimately dependent upon claim 9. As discussed above, Shiomi et al. does not disclose all of the limitations of claim 9. Thus, at least for the same reasons, Shiomi et al. also does not disclose the limitations of claim 10.

In addition the outstanding Office Action acknowledges other deficiencies in claims 10 and attempts to overcome these deficiencies by combining Casey et al. with Shiomi et al. However, Casey et al. cannot overcome all of the deficiencies of Shiomi et al., as will be discussed below.

Casey et al. discloses a system that utilizes a television camera, a video recorder and a synchronized stroboscopic light source to provide an arrangement for analysis of high speed mechanical motion. However, Casey et al. nowhere discloses, as claim 10 recites:

*a controller that is operatively connected between the processor and the manufacturing process,
wherein the controller obtains parameter information from the manufacturing process that is used to synchronize the light source and the image capturing device,
wherein the processor strobes the light source and actuates the image capturing device to capture an image of a feature of the moving object at a periodicity corresponding to a movement of the moving object (emphasis added).*

That is, Casey et al. nowhere discloses the concepts of: “a controller that is operatively connected between the processor and the manufacturing process” and “the controller obtains

parameter information from the manufacturing process that is used to synchronize the light source and the image capturing device” as recited in claim 10. Thus, Casey et al. cannot overcome all of the deficiencies of Shiomi et al. Therefore, it is respectfully submitted that neither Shiomi et al. or Casey et al., whether taken alone or in combination, do not disclose, suggest or make obvious the claimed invention and that claim 10, and claims dependent thereon, patentably distinguish thereover.

Claims 14-17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Shiomi et al. in view of Sandu et al. Reconsideration is respectfully requested.

As discussed above, Shiomi et al. does not disclose the limitations of claim 14. Claims 15-17 are ultimately dependent upon claim 14. Thus, at least for the reasons discussed above, claims 15-17 are also not disclosed by Shiomi et al.

In addition the outstanding Office Action acknowledges other deficiencies in claims 14-17 and attempts to overcome these deficiencies by combining Sandu et al. with Shiomi et al. However, Sandu et al. cannot overcome all of the deficiencies of Shiomi et al., as will be discussed below.

Sandu et al. discloses a method and apparatus for controlling a chemical mechanical planarization (CMP) process in semiconductor manufacture includes an infrared camera for detecting and mapping a temperature of the wafer for developing a thermal image of the wafer. However, Sandu et al. nowhere discloses, as claim 14 recites:

a controller operatively coupled to the device that obtains parameter information on the periodic movement of the object;
a photo-stroboscopic camera which captures an image of a feature of the object during the process;
a memory device storing a plurality of reference images corresponding to two or more process conditions at associated sample times; and
a processor coupled to the photo-stroboscopic camera and the memory device,

wherein the controller obtained parameter information on the periodic movement is used to synchronize the photo-stroboscopic camera and the process (emphasis added).

That is, Sandu et al. nowhere discloses the concepts of: “a controller operatively coupled to the device that obtains parameter information on the periodic movement of the object” and “the controller obtained parameter information on the periodic movement is used to synchronize the photo-stroboscopic camera and the process” as recited in claim 14. Thus, Sandu et al. cannot overcome all of the deficiencies of Shiomi et al. Therefore, it is respectfully submitted that neither Shiomi et al. or Sandu et al., whether taken alone or in combination, do not disclose, suggest or make obvious the claimed invention and that claim 14, and claims dependent thereon, patentably distinguish thereover.

Conclusion

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 09-0456, under Order No. 21806-00112-US1 from which the undersigned is authorized to draw.

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Respectfully submitted,

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